REMARKS

The typographical error in part of the priority claim has been corrected. Applicant respectfully requests a further corrected filing receipt, showing correction of the priority claim in the present Application.

A letter submitting formal drawings, as required, is submitted in conjunction herewith.

The title has been amended in a manner consistent with the suggestion of the Examiner.

Independent claims 2 and 15 have been amended for clarification, beyond doubt, that the color filter recited in these claims has only two colors. The prior claim language recited a 'two color" red-green checkerboard filter pattern, which Applicant believes was quite clear as containing only two colors (as in Figure 2, and in accordance with common usage of the term). However, the Office Action stated: "The examiner notes that the claim language is written broadly and therefore, the examiner does not believe that claim is limited to an image sensor only having red and green pixel (sic) arranged in a checkerboard pattern." Although Applicant disagrees regarding the Examiner's conclusion, in the interest of facilitating the prosecution, claims 2 and 15 have been amended to recite that the color filter has "only two colors," and this should remove the issue completely.

Independent claim 2 has also been amended to include the limitations of dependent claims 3 and 4, and dependent claims 3 and 4 have been cancelled. Also,

the dependencies of claims 5, 7, and 8 have been adjusted accordingly, and claim 6 has been cancelled. Also, claim 8 has been editorially amended to remove the Examiner's objection.

The claim rejections based on Muramoto in view of Nohda should be obviated by the claim amendments. Reconsideration is respectfully requested.

Claim 2, as amended, recites a method for producing electronic video signals representative of color images of a scene, including the following steps: providing a luminance sensor and a color sensor having a color filter thereover, the color filter having only two colors, in a red-green checkerboard filter pattern; providing a beamsplitter, and providing a lens system that focuses light from the image, via the beamsplitter, onto the luminance sensor and the color sensor; and producing electronic video signals from outputs of the luminance sensor and the color sensor; the step of producing video signals from the output of the color sensor including diagonal binning of the signals from the color sensor to obtain a red color signal and a green color signal. Dependent claim 5 recites that the diagonal binning includes clocking out of the color sensor using alternating horizontal and vertical shifts. Dependent claims 7 and 8 recite that the step of producing video signals from the outputs of the luminance sensor and the color sensor includes deriving a blue color signal from the output of the luminance sensor and the red and blue color signals, and dependent claims 9 and 10 recite that the step of producing video signals further includes decimating and interpolating the red and green color signals to obtain low resolution red and green color signals, filtering the luminance signals to obtain a low resolution white signal, and deriving a low resolution

blue color signal from the low resolution white signal and the low resolution red and green color signals. Dependent claims 11 and 12 recite that the step of producing video signals further includes deriving high resolution red, green, and blue color signals from the low resolution red, blue, and green signals and the luminance signal, and claims 13 and 14 recite that the step of providing a lens system comprises providing a motion picture film camera type of lens system. Independent claim 15, in apparatus form, also has been amended to clarify, beyond doubt, that the color filter has only two colors.

As described in Applicant's Specification, an advantage of using a checkerboard filter pattern that passes red and green is that blue will then be the derived color. The derived color will have the lowest signal-to-noise ratio, and this can be best tolerated in the blue (see, for example, page 9 of the Specification). This feature is not disclosed or suggested in the prior art.

The Muramoto U.S. Patent 5,523,875, applied in the Office Action, discloses an image pickup apparatus used in a video camera that employs a CCD sensor. At column 8, lines 25-31, Muramoto states:

> "In Figure 9, low frequency components RL, WL, and BL are separated from the R signal (Ri), W signal (Wi), and B signal (Bi) which were input in Figure 9 by low pass filters 211, 212, and 213. Subsequently, the low frequency components RL and BL are subtracted from the low frequency component WL at a predetermined ratio by a subtracter 217, thereby obtaining a G signal."

As seen, the derived color in Muramoto is green (G), so that lowest signal-to-noise ratio will be in the green, in which it is less well tolerated than in the blue.

As above noted, the Examiner had argued that Applicant's claims were not limited to a color sensor having only red and green in a checkerboard pattern, but this has now been clarified beyond any doubt. Accordingly, independent claims 2 and 15 should certainly be allowable.

Further with regard to amended claim 2, the feature of diagonal binning of the signals from the color sensor to obtain a red color signal and a green color signal is not disclosed or suggested in the prior art. As defined further in claim 5, the diagonal binning includes clocking out of the color sensor using alternating horizontal and vertical shifts, and this is also not disclosed or suggested in the prior art. With regard to the features and claims at issue, the Examiner had stated the following:

> "In regards to Claim 3, Muramoto teaches on Column 5, Lines 3-12 the step of producing video signals from the outputs of the luminance sensor (15) and the color sensor (14) includes binning of the signals from the color sensor (14). Muramoto teaches that the three colors are separated so processing can be performed individually for each color. Furthermore, Nodha teaches that the pixels are arranged in a diagonal checkerboard arrangement. Therefore, the binning would occur diagonally."
>
> "In regards to Claim 5, Muramoto in view of Nohda teaches on Column 5, Lines 3-12 the step of producing video signals from the outputs of the luminance sensor (15) and the color sensor (14) includes binning of the signals from the color sensor (14). Muramoto teaches that the three colors are separated so processing can be performed individually for each color. Furthermore, Nohda teaches that the pixels are arranged in a diagonal checkerboard arrangement with red and green pixels arranged

> diagonally. Therefore, it is inherent that the readout clock signals from the CCD image sensor are alternated horizontally and vertically or else the colors could not be properly separated."

These arguments are applying circular reasoning. The Examiner is saying, in effect, that although the citations do not disclose the technique that is defined in Applicant's claims, they are separating colors, so they must be doing it the same way as Applicant! This is neither logical nor correct. First of all, as the Examiner tacitly acknowledges, the citations are using different patterns of colors than Applicant. Secondly, there are various ways in which a pattern can be read out, and the technique used by Applicant is certainly not disclosed in the applied art. (Indeed, the technique would not work to give Applicant's result, in any event, even if it was applied to the patterns of the citations – although there would be no reason to do so in the absence of Applicant's teachings and hindsight.)

The foregoing is completely dispositive of the issues, but the further dependent claims recite additional features that distinguish over the prior art. For example, dependent claims 9 and 10 recite that the said step of producing video signals further includes decimating and interpolating the red and green color signals to obtain low resolution red and green color signals, filtering the luminance signals to obtain a low resolution white signal, and deriving a low resolution blue color signal from said low resolution white signal and said low resolution red and green color signals. In the Office Action, the Examiner states:

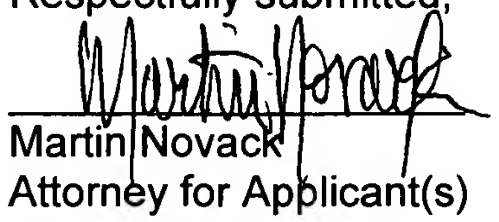
> "However, Muramoto does not teach decimating and interpolating the red and green color signals to obtain low resolution red and green color signals.

> "Nodha further depicts in Figure 14 and teaches on Column 11, Lines 12-27 and in the abstract that it is advantageous to provide a digital camera with an decimation and interpolation function (85-87) in order to allow a camera to obtain a high resolution image at a reasonable cost by decreasing the complexity of the processing required."

However, a study of Nohda reveals that the cited passages and diagram of Nohda never even mention decimation, much less the specific technique, defined in Applicant's claims 9 and 10, for generating a low resolution blue color signal from decimated and interpolated red and green color signals, filtering luminance to obtain low resolution white, and then deriving the low resolution blue signal from the low resolution white and the low resolution red and green. This technique is used to obtain a proper low resolution blue color signal and not, as the Examiner speculated, to save cost by reducing complexity. Again, it is evident that the rejections should be vacated.

In view of the foregoing, it is believed that the Application is now in condition for allowance, and such favorable action is earnestly solicited. In the event that the Examiner is not persuaded, it is asked that he kindly telephone the undersigned Counsel collect so that any remaining issues can be resolved.

Respectfully submitted,



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